Inspection Technologies

XL PRO™ VideoProbe®

Remote Visual Inspection







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XL PRO™VideoProbe® XL PRO Plus VideoProbe®



Inspecting the GE90 engine with the XL PRO VideoProbe

The XL PRO and XL PRO Plus VideoProbe system are the world's most advanced tools for remote visual inspection. Each XL PRO system is designed to be portable, easy to use and has unparalleled imaging capabilities. Used in a wide range of industry applications, the XL PRO system has become the top choice for remote visual inspection needs at businesses around the world.

XL PRO Features

- 3.5 in. Floppy drive
- 16MB internal Flash memory

XL PRO Plus Features

- Two hours of DVD-format, MPEG2 full-motion video
- CompactFlash® digital storage media
- USB Streaming Video port
- 64MB internal Flash memory

XL PRO Common Features

- Integrated Temperature Warning System
- Probe interchangeability with six diameters available
- Complete portability with AC, DC or battery operation
- The only video borescope with three measurement modes
 ShadowProbe[®], StereoProbe[®] and Comparison
- iVIEW[™] image management



Hardware Features



A: Processor / Light Source

The Processor/Light Source combines a brilliant 50 watts of Metal-Halide illumination with a sophisticated computing platform for the XL PRO $^{\rm TM}$ system. It is available in two models with the following features:

XL PRO Plus

- Removable CompactFlash® data storage for Video and Still images
- Full-motion MPEG1/MPEG2 audio/video recording and playback
- USB streaming video port
- Internal 64MB Flash memory

XL PRO

- 3.5 in. Floppy drive for still image storage
- Internal 16MB Flash memory

B: Portable Shipping / Operating Case

A unique dual-purpose shipping and operating case protects the XL PRO system from possible transport damage, and doubles as the operating station. Operate the VideoProbe® system in or out of its case.

C: Hand-Piece

The ergonomic Hand-Piece provides one-handed operation with intuitive joystick articulation, large control buttons and a high-resolution color LCD. The innovative Hand-Piece features:

- Joystick for All-Way articulation and menu control
- Shock-mounted LCD monitor
- Integrated microphone
- Insertion tube torsional strain-relief
- Impact-absorbing rubber bumpers

D: Probe

From the world's smallest borescope with All-Way articulation and StereoProbe® measurement capability – the 3.9 mm diameter – to the 6.2 mm VideoProbe XL PRO system with an internal working channel, our interchangeable probes are built to withstand almost any environment. Ruggedly constructed, the probes are protected by:

- Titanium camera heads
- Ouad-wall insertion tube construction
- Tungsten braid over entire insertion tube and bending neck
- Force-limited, servo-motor articulation

XL PRO Plus



XL PRO



E: All-Way® Probe Tip Articulation

F: Backpack and PowerBar

For added portability, the XL PRO system can be carried in a backpack and powered by the PowerBar™ battery pack.

G: Portable Case

Easily carry two probes and accessories to your inspection site using portable case options.

Probe Diameters



System Features

Temperature Warning System

The only video borescope product with an integrated Temperature Warning System to prevent damage and protect your investment. With a Temperature Sensor built into the camera, this system provides three levels of on-screen temperature conditions to prevent damage from high-temperature inspection environments.



CompactFlash® Storage

Removable CompactFlash digital storage media for Full-Motion Audio/Video and Still-image capture. Record and playback over 2 hours of MPEG2 video on a 2GB CompactFlash card. Accepts any size CompactFlash Type I card.

USB Video Port

Stream live video from the XL PRO™ Plus to your personal computer for viewing or archiving.





Measurement

Three modes to meet your measurement challenges. The only video borescope to offer ShadowProbe®, StereoProbe® and Comparison measurement capabilities. ProView image enhancement and zoom window features allow precise cursor placement.

ShadowProbe Technology

Use the ShadowProbe's patented shadow projection triangulation method to accurately perform Distance, Skew, Depth, Area, Multi-Segment Length, Point-to-Line and Circle Gauge measurements.

StereoProbe Technology

StereoProbe measurement is essential for inspecting curved and irregular surfaces. Using dual-image technology, views are taken from two angles and automatically analyzed for maximum accuracy. StereoProbe measurements include: Length, Point-to- Line, Depth, Area, and Multi-Segment Length.

Comparison Measurement

Built-in Comparison Measurement software lets you measure items in an image field using known dimensions of another object in that field. Comparison measurement types include: Length, Point-to-Line, Area, Multi-Segment Length and Circle Gauge.



File Manager for Thumbnail View



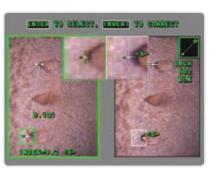
Split Screen View



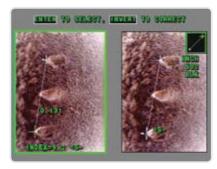
ShadowProbe Measurement



Comparison Measurement



StereoProbe Measurement with 3x Zoom Window



StereoProbe with ProView Image Enhancement

The accuracy of all XL PRO measurement systems are verified with calibration equipment that is NIST (National Institute of Standards and Technology) traceable.



On-Screen Keyboard for Annotation



International Language Support

XL PRO™ Software Features

Intuitive Drop-Down Menu System

Access the advanced feature set via a drop-down menu system.

Multi-Language Interface

Only the XL PRO system allows you to choose from over nine language options for operation and documentation.

Multi-Function Joystick

The joystick controls probe articulation, menu navigation and measurement functions.

On-Board File Manager

The file manager lets you create and name file folders, then move and store files between folders in internal or external memory.

Integrated Text and Graphics Control

Use an external keyboard or the hand-piece joystick to place text annotation, graphic call-out arrows or company logos onto any live, frozen or recalled image.

Applications / Industries



Aviation:

Commercial, Military, OEM, MRO and Business

Power:

Nuclear, Fossil, Combustion Turbine, Combined-cycle, Hydro and Wind

Process:

Offshore, Refining, Chemical, Distribution/Transportation, Food, Ultra-pure and Water Treatment

Automotive:

Manufacturing, Service and OEM

Other:

Shipping, Law Enforcement



Industrial gas turbine Inspection



Industrial probe inspection of a refinery finfan heat exchanger



VideoProbe® inspection of an electric power plant HP Feedwater heater



Law enforcement training exercise using the Covert VideoProbe system



Windmill gear box inspection



XL PRO™ case hoisted by cable to top of windmill

Specialty Probes

Specialized Applications

GE Inspection Technologies knows there are situations that require unique tools to get the job done right. That's why it has developed a range of specialty video borescopes that are built to serve industry-specific requirements. For more information on specialty video borescopes, please go to www.ge.com/inspectiontechnologies.

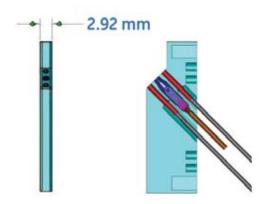


Industrial VideoProbe®

A probe for the darkest, wettest industrial environments. The Industrial VideoProbe system uses interchangeable, water-resistant lenses, combined with a full 360° ring of illumination fiber optics and adjustable tip focus to obtain brilliant, clear images in large pipes and vessels.

LongSteer® VideoProbe® System

The world's longest articulating VideoProbe system! Available in lengths up to 30.5 m (100.0 ft.), the LongSteer VideoProbe system is ideal for long runs in small-diameter piping. This probe is available in 6.1 mm and 10.0 mm diameters.



Mini-Probe

A custom probe for narrow passages 2.92 mm wide

Custom Probes

With over 20-years experience at RVI product customization we are committed to providing our customers with the tools they need to get the job done. Just provide us with the details and our Custom Solutions Group will deliver an answer.



High-Purity-Weld VideoProbe

This probe allows for easier manipulation in weld inspection environments. It has a non-articulating supple bending section at the tip that enables insertion through tight pipe bends and 360° inspection of orbital welds. An advanced system pendant which provides additional optional features, including measurement capabilities is available.

POLICE

SWAT team training exercise using a Covert VideoProbe system

Covert VideoProbe

Particularly suited to law enforcement and surveillance operations, this probe incorporates a long-exposure mode for superior viewing in low-light situations. Dedicated controls allow the operator to switch off the lamp and lower the speed of the ventilation fan for diminished noise and reduced detection. The Covert system can also be carried on a Covert Backpack and powered by the PowerBarTM battery pack.





External Retrieval Tools

External retrieval tools are available for other probe tip diameters. The fork and tine tool is shown here.



Modular System and Accessories



PC Connectivity/Applications



Advanced User Interface



iVIEW[™] Remote XL PRO[™]

Allows complete remote control of the XL PROTM system, from across the room or across the world. With the XL PRO system connected to a PC at the inspection site, a remote user with an internet or other network connection can control all menu functions, probe movements and camera capabilities to view, zoom and measure defects.

iVIEW PC

FREE software that extends iVIEW capabilities to your PC. Using a Microsoft® Windows® interface that duplicates the XL PRO system menu functions, users can download workable images to any PC. Manipulate, re-measure, compare, annotate, e-mail images to other locations, review inspection results and automatically generate reports in Microsoft Word format. Download iView PC at www.ge.com/inspectiontechnologies or contact Remote Visual Inspection Customer Service for the CD-ROM.

Software

Operating System: User Interface: File Manager: Audio Data: Image Controls: Image Management: **Exposure Control:** Digital Zoom: Still Image Formats: Video Record Formats: Annotation: **Articulation Controls:** Lamp Control: Software Updates: Remote Control: **Temperature Warning:** Real-time multitasking

Simple drop-down menu-driven operation
File and folder creation, naming, copying, deletion
PC compatible, 15 second files (WAV format)
Handset brightness control – gain and exposure
Single button freeze frame, Full or Split screen
Automatic or Manual (34 msec to 8 seconds)
1X to 3X – Continuous and 5-Level Stepped
BITMAP or JPEG (Super High, High or Low. JPG)
MPEG2 (High or Low), MPEG1 (High, Med or Low)
Text and Graphic screen overlays and custom logos
All-Way® steering, Steer/Stay, Home, Fine or Coarse
Manual brightness and software On/Off
Field upgradeable via removable media
PC control via iVIEW™ Remote XL PRO™ application
Integrated camera temperature warning system

Languages

User selectable: English, Spanish, French, German, Italian, Russian, Japanese, Swedish, Portuguese and Chinese

Measurement

Supported Measurement Features

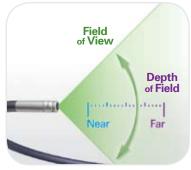
Feature	ShadowProbe®	StereoProbe [®]	Comparison
Length/Distance			
Depth			
Point to Line			
Skew			
Area			
Multi-Segment Length			
Circle Gauge			
3x Zoom Windows			
5 Measurements per image			

Optical Tips

Tip View (DOV)	Tip Color	Field of View (FOV)*	Depth of Field (DOF)	Magnification** 13" Monitor/5" LCD	3.9 mm Optical Tip Part #	5.0 mm Optical Tip Part #	6.1 mm Optical Tip Part #	6.2 mm Optical Tip Part #	7.3 mm Optical Tip Part #	8.4 mm Optical Tip Part #
Standard										
FORWARD	NONE 🗵	80°	6-80 mm (0.24-3.15 in.)	37X / 15X	PXT480FG					
FORWARD	NONE 🖂	50°	50 mm (1.97 in.)-infinity	10X / 4X		PXT550FF	XT650FF		PXT750FF	XT850FF
FORWARD	WHITE O	50°	12-200 mm (0.47-7.87 in.)	30X / 11X		PXT550FG	PXT650FG		PXT750FG	PXT850FG
FORWARD	YELLOW	90°	20 mm (0.79 in.)-infinity	12X / 5X			PXT690FF			PXT890FF
FORWARD	ORANGE •	80°	3-20 mm (0.12-0.79 in.)	70X / 27X		PXT580FN	PXT680FN			
FORWARD	BLACK •	100°	5-120 mm (0.20-4.72 in.)	45X / 17X		PXT5100FG	PXT6100FG		PXT7100FG	PXT8100FG
FORWARD	NONE 🗵	40°	100 mm (3.94 in.)-infinity	10X / 4X				PXT6240FF		
FORWARD	YELLOW	120°	25 mm (0.98 in.)-infinity	7X / 3X				PXT62120FF		
FORWARD	BLACK •	120°	4-190 mm (0.16-7.48 in.)	33X / 13X				PXT62120FN		
SIDE	BROWN •	80°	4-80 mm (0.16-3.15 in.)	37X / 15X	PXT480SG					
SIDE	BROWN •	50°	45 mm (1.77 in.)-infinity	10X / 4X			PXT650SF		PXT750SF	XT850SF
SIDE	GREEN •	50°	9-160 mm (0.35-6.30 in.)	30X / 11X		PXT550SG	PXT650SG		PXT750SG	PXT850SG
SIDE	RED •	80°	1-20 mm (0.04-0.79 in.)	70X / 27X		PXT580SN	PXT680SN		PXT780SN	PXT880SN
SIDE	BLUE •	100°	4-100 mm (0.16-3.94 in.)	30X / 11X		PXT5100SG	PXT6100SG		PXT7100SG	PXT8100S0
45° (FORWARD / OBLIQUE)	PURPLE •	50°	12-80 mm (0.47-3.15 in.)	30X / 11X			PXT650FB			
WIDE ANGLE***	NONE 🛛	220°	3-50 mm (0.12-1.97 in.)				PXT6220FN			
ShadowPro	be® Meas	uremen	it							
FORWARD	WHITE O	50°	12-30 mm (0.47-1.18 in.)	30X / 11X			PXT650FG		PXTM750FG	
SIDE	GREEN •	50°	12-35 mm (0.47-1.38 in.)	30X / 11X			PXT650SG		PXTM750SG	
SIDE	BLUE •	50°	7-24 mm (0.28-0.94 in.)	50X / 19X			PXT650SN		PXTM750SN	
StereoProb	e® Measu	rement								
FORWARD	BLACK •		4-80 mm (0.16-3.15 in.)	37X / 15X		PXTM56060FG	PXTM66060FG		PXTM76060FG	
FORWARD	BLACK •	50°/50°	5-45 mm (0.20-1.77 in.)	44X / 14X	PXTM45050FG					
FORWARD	BLACK •	60°/60°	5 mm (0.20 in.)-infinity	30X / 12X				PXTM626060FG		
SIDE	BLUE •		2–50 mm (0.08–1.97 in.)	37X / 15X			PXTM65050SG		PXTM75050SG	
SIDE	BLUE •	45°/45°	2-50 mm (0.08-1.97 in.)	45X / 17X		PXTM54545SG				
SIDE	BLUE •	50°/50°	4-45 mm (0.16-1.77 in.)	44X / 14X	PXTM45050SG					
SIDE	BLUE •	60°/60°	4 mm (0.16 in.)-infinity	30X / 12X				PXTM626060SG		

^{*}FOV is specified diagonally.

^{***} Outer Ø 8.4 mm for use with 6.1 mm Ø VideoProbe®



Forward-View Optical Tip



Forward/Oblique-View Optical Tip



Side-View Optical Tip

^{**}Magnification specifications at near-side of tip Depth of Field.

Technical Specifications

System Case Dimensions: 55.9 x 55.9 x 26.7 cm (22.0 x 22.0 x10.5 in.)

Weight: In case 15.9 kg (35.0 lbs.)

Without case 7.7 kg (17.0 lbs.)

AC Power Nominal input: 100-240 V (min 90 V, max 250 V); Power Supply:

50-400 Hz; 150 W max, 2 A max DC Power Nominal input: 11-14 V, 11 A max +28 VDC via accessory adapter

Camera

5.0, 6.1, 7.3 and 8.4 mm ø VideoProbes

1/6 in. Color SUPER HAD™ CCD Image Sensor: Pixel Count: 380,000 pixels NTSC; 440,000 pixels PAL Automatic or Manual (34 msec to 12 seconds) Long Exposure:

White Balance: Factory default or user defined

Housing: 5.0, 6.1, 7.3 mm - Titanium; 8.4 mm - Stainless Steel

3.9 and 6.2 mm ø VideoProbe

Image Sensor: 1/10 in. Color SUPER HAD CCD Pixel Count: 250,000 pixels NTSC; 290,000 pixels PAL Long Exposure: Automatic or Manual (34 msec to 12 seconds)

White Balance: Factory default or user defined

Housing: Titanium

Hand-Piece

30.5 x 14.7 x 12.7 cm (12.0 x 5.8 x 5.0 in.) **Dimensions:** Weight: 2.3 kg (5.1 lbs.) typical; includes insertion tube, power plug, power tube and hand-piece

Power Tube:

ABS housing with integrated Santoprene® bumpers Construction: 12.7 cm (5.0 in.) diagonal integrated TFT color LCD ICD Monitor 360° All-Way® servo-motor tip articulation Articulation: Joystick and complete button function set **User Controls:** Microphone: Integrated high-sensitivity microphone

Tip Articulation

Insertion Tube

Length	Straight Tube					
4.5 m and less	Up/Down - 140° min, Left/Right - 140° min					
6.0 m	Up/Down - 120° min, Left/Right - 120° min					
7.5 m	Up/Down – 110° min, Left/Right – 110° min					

Note: Typical articulation exceeds minimum specifications

Operating Environment

Tip Operating Temp: -25° to 80°C (-13° to 176°F) System Operating Temp: -20° to 46°C (-4° to 115°F) Storage Temperature: -25° to 60°C (-13° to 140°F) **Relative Humidity:** 95% max

Waterproof: Insertion tube and tip to

1 bar (14.7 psig, 10.2 $\overset{\cdot}{\text{m}}$ of H2O, 33.5 ft H2O) Hazardous Environments: Not rated for use in hazardous environments

Processor/Light Source

Dimensions: 27.9 W x 29.5 D x 14.0 H cm (11.0 x 11.6 x 5.5 in.)

Weight: 5.4 kg (12.0 lbs.)

Construction: Aluminum chassis with polyurethane bumpers 32 bit Pentium®-class embedded computer Processor:

Brightness Control: Automatic and Variable Lamp Type: 50 W Metal-Halide Arc Lamp Output: 2600 lumens at 5885K 1000 hrs median Lamp Life: **Keyboard Input:**

PS/2 style keyboard connector Audio Speaker: Built-in front panel speaker with volume control knob

Audio Out Jack: RCA style connector, line-level audio out S-Video and Composite BNC (XL PRO only) inputs Video Input: Video Output: S-Video and USB 1.1 streaming digital video

Remote Control: RS-232, DB-9F Connector 64MB internal Flash memory Memory:

CompactFlash®, Type I, accepts all memory sizes Disk Drives: .BMP uncompressed – 900KB typical file size Still Image Storage: .JPG Super High Quality - 200KB typical file size

.JPG High Quality – 90KB typical file size .JPG Low - 30KB typical file size

Video Recording: MPEG2: High and Low Quality Settings

Up to 42 minutes recording on High w/1GB CF card MPEG1: High, Medium and Low Quality Settings Up to 92 minutes recording on Med w/1GB CF card

XL PRO™ Plus Specifications

64MB internal Flash memoru Memoru:

CompactFlash®, Type I, accepts all memory sizes Disk Drives: Still Image Storage: .BMP uncompressed - 900 KB typical file size

.JPG Super High Quality - 200 KB typical file size .JPG High Quality – 90 KB typical file size

.JPG Low - 30 KB typical file size

Video Recording: MPEG2: High and Low Quality Settings, Up to 42

minutes recording on High w/1GB CF card MPEG1: High, Medium and Low Quality Settings, Up

to 92 minutes recording on Med w/1 GB CF card S-Video and USB 1.1 streaming digital video

XL PRO Specifications

Video Output:

Memoru: 16MB internal Flash memory Disk Drive: 3.5 in. Floppy (accepts 32 MB FlashPath® media) .BMP uncompressed - 900 KB typical file size Still Image Storage: .JPG High Quality - 90 KB typical file size

.JPG Super High Quality – 200 KB typical file size .JPG Low - 30 KB typical file size optical tip adaptor tungsten wire braid 4 articulation cables/fiber-optic lighting articulation cables/video cables apertur polyurethane outer layer polyurethane inner layer steel monocoil (1)(1)(1)(1)(1) Bending Neck Camera Head Insertion Tube

working channel tool (6.2 and 7.3 mm ø only) temperature sensor Note: Illustration is not drawn to scale.

PRODUCT	CAMERA DIAMETER	INSERTION TUBE WORKING LENGTH								
	3.9 mm (0.154 in.)	1.5 m (4.9 ft.) 2.0 m (6.6 ft.) 2.5 m (8.2	t.) 3.0 m (9.8 ft.)							
	5.0 mm (0.197 in.)	1.5 m (4.9 ft.) 2.0 m (6.6 ft.) 2.5 m (8.2	t.) 3.0 m (9.8 ft.)							
VideoProbe®	6.2 mm (0.244 in.)	2.6 m (8.5	t.) 3.2 m (10.5 ft.)	Full selection o	f retrieval tools o	vailable.				
XL PRO™ Plus	7.3 mm (0.287 in.)	2.6 m (8.5	t.) 3.2 m (10.5 ft.)	Full selection of retrieval tools available.						
	6.1 mm (0.240 in.)	1.5 m (4.9 ft.) 2.0 m (6.6 ft.) 2.5 m (8.2	t.) 3.0 m (9.8 ft.)	4.5 m (14.8 ft.)	6.0 m (19.7 ft.)	7.5 m (24.6 ft.)	9.6 m (31.5 ft.)	Full selection of re	etrieval tools available.	
	8.4 mm (0.331 in.)	1.5 m (4.9 ft.) 2.0 m (6.6 ft.)	3.0 m (9.8 ft.)	4.5 m (14.8 ft.) $6.0 m$ (19.7 ft.) $7.5 m$ (24.6 ft.) Full selection of retrieval tools available.			ble.			
Industrial VideoProbe®	8.4 mm (0.331 in.)	2.0 m (6.6 ft.)	3.0 m (9.8 ft.)	4.5 m (14.8 ft.)	6.0 m (19.7 ft.)	7.5 m (24.6 ft.)	9.0 m (30.0 ft.)	18.0 m (59.0 ft.)		
LongSteer® VideoProbe®	6.1 mm (0.240 in.)						12.2 m (40.0 ft.)	18.3 m (60.0 ft.)		
	10.0 mm (0.394 in.)	8.4 mm bending neck and head can					12.2 m (40.0 ft.)	18.3 m (60.0 ft.)	30.5 m (100.0 ft.)	

XL PRO™ and XL PRO Plus Models

		XL PRC	XL PRO P	XL PRO Plus Models		
	PXL Base	PXLD Digital	PXLA Advanced	PXLM Measurement	PXLA Advanced	PXLM Measurement
Basic System Functions						
Shipping/Operating Case						
All-Way® Tip Articulation						
Probe Interchangeability – 5 Diameters						
Interchangeable Tip Optics						
Tungsten Braid Insertion Tube and Bending Neck						
Lamp Brightness Control						
50W Metal-Halide Light Source						
Color LCD – 12.7 cm (5.0 in.) active matrix TFT						
AC or DC Power Operation						
Processor / Light Source Functions						
Temperature Warning System (select diameters)						
Long Exposure Mode						
Language Selection						
Split-Screen Viewing						
Digital Zoom – 3X				•		
Text Annotation						
Voice Annotation				-	_	
Arrow Annotation				-		
Internal Flash Memory – 64MB						
Internal Flash Memory – 16MB		•				
Floppy Disk Drive storage		_	_	_		
CompactFlash® storage					_	
Still Image Recording					-	
Video Recording – Full Motion						
Live Audio Output				_	_	
Live Video Output						
Video Input				-		
video iriput						
USB Streaming Video port						
Measurement Functions						
ShadowProbe® Measurement – 7 Types						
StereoProbe® Measurement – 5 Types						
Comparison Measurement – 5 Types						
ProView Enhanced Viewing						
3X Zoom Windows for cursor placements						
Computer Interface						
iView™ PC						
iVIEW Remote						





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Standards Compliance

Every Measurement System is supplied with a Certificate of Compliance which indicates that the probe was manufactured and tested to measurement standards traceable to NIST (National Institute of Standards and Technology). Further, every Measurement System is supplied with a measurement verification block which contains test targets which are NIST traceable.







GE Inspection Technologies: productivity through inspection solutions

GE Inspection Technologies provides technology-driven inspection solutions that deliver productivity, quality and safety. We design, manufacture and service ultrasonic, remote visual, radiographic and eddy current equipment and systems. We offer specialized solutions that will help you improve productivity in your applications in the aerospace, power generation, oil & gas, automotive or metals industries.

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